

WHAT IS CLAIMED IS:

1. An isolated and purified *Bacillus thuringiensis* crystal protein comprising the amino acid sequence of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:26
5 SEQ ID NO:28, or SEQ ID NO:30.
2. The protein of claim 1, wherein said protein is insecticidally active against
10 *Spodoptera frugiperda*, *Spodoptera exigua*, *Heliothis virescens*, *Helicoverpa zea*, or *Ostrinia nubilalis*.
3. The protein of claim 2, wherein said protein is insecticidally active against *S.*
15 *frugiperda* and *S. exigua*.
4. The protein of claim 1, wherein said crystal protein is isolated from *Bacillus*
20 *thuringiensis* EG11060, EG11062, EG11063, EG11071, EG11073, EG11074, EG11090, EG11091, EG11092, EG11735, or EG11751.
5. The protein of claim 4, wherein said crystal protein is isolated from *Bacillus*
25 *thuringiensis* EG11063, EG11074, EG11090, EG11092, EG11735, or EG11751.
6. A purified nucleic acid segment encoding the crystal protein of claim 1.

7. The nucleic acid segment of claim 6, wherein said segment encodes a δ endotoxin having insecticidal activity against *Spodoptera frugiperda*, *Spodoptera exigua*, *Heliothis virescens*, *Helicoverpa zea* or *Ostrinia nubilalis*.
- 5 8. The nucleic acid segment of claim 7, wherein said segment encodes a δ endotoxin having insecticidal activity against *Spodoptera frugiperda* and *Spodoptera exigua*.
- 10 9. The nucleic acid segment of claim 7, further defined as encoding a protein comprising the amino acid sequence of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:26, SEQ ID NO:28, or SEQ ID NO:30.
- 15 10. The nucleic acid segment of claim 9, further defined as comprising the nucleic acid sequence of SEQ ID NO:9, or the complement thereof, or a sequence which hybridizes to the sequence of SEQ ID NO:9; or the nucleic acid sequence of SEQ ID NO:11, or the complement thereof, or a sequence which hybridizes to the sequence of SEQ ID NO:11; or the nucleic acid sequence SEQ ID NO:13, or the complement thereof, or a sequence which hybridizes to the sequence of SEQ ID NO:13; or the nucleic acid sequence SEQ ID NO:25, or the complement thereof, or a sequence which hybridizes to the sequence of SEQ ID NO:25; or the nucleic acid sequence SEQ ID NO:27, or the complement thereof, or a sequence which hybridizes to the sequence of SEQ ID NO:27; or the nucleic acid sequence SEQ ID NO:29, or the complement thereof, or a sequence which hybridizes to the sequence of SEQ ID NO:29.
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11. The nucleic acid segment of claim 6, further defined as an RNA segment.
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12. The nucleic acid segment of claim 7, further comprising a recombinant vector.
- 5 13. The nucleic acid segment of claim 12, wherein said vector is pEG1068, pEG107⁻, pEG1091, pEG11092, pEG1093, pEG365, or pEG378.
- 10 14. The nucleic acid segment of claim 12, wherein said nucleic acid segment is operatively linked to a promoter, said promoter expressing said nucleic acid segment.
- 15 15. A recombinant host cell comprising the nucleic acid segment of claim 12.
16. The recombinant host cell of claim 15, further defined as a prokaryotic cell.
- 20 17. The recombinant host cell of claim 16, further defined as a bacterial cell.
- 25 18. The recombinant host cell of claim 17, wherein said bacterial cell is an *E. coli*, *E. thuringiensis*, *B. subtilis*, *B. megaterium*, or a *Pseudomonas* spp. cell.
- 30 19. The recombinant host cell of claim 18, wherein said bacterial cell is *B. thuringiensis*, EG11063, EG11074, EG11090, EG11092, EG11735, EG11751, NRRL B-2157⁹, NRRL B-21580, NRRL B-21581, NRRL B-21635 or NRRL B-21636.

20. The recombinant host cell of claim 15, defined further as being a eukaryotic cell.

5 21. The recombinant host cell of claim 20, further defined as a plant cell.

22. The recombinant host cell of claim 21, wherein said plant cell is a corn, wheat, oat,
10 barley, maize, rye, turf grass, pasture grass, vegetable, berry, fruit, tree, or
ornamental plant cell.

23. The recombinant host cell of claim 15, wherein said nucleic acid segment is
15 introduced into the cell by means of a recombinant vector.

24. The recombinant host cell of claim 15, wherein said host cell expresses said nucleic
acid segment to produce a crystal protein or peptide.

20 25. A method of using a DNA segment that encodes a crystal protein or peptide,
comprising the steps of:

25 (a) preparing a recombinant vector in which a crystal protein or peptide-
encoding DNA segment is positioned under the control of a promoter;

(b) introducing said recombinant vector into a host cell;

30 (c) culturing said host cell under conditions effective to allow expression of the
encoded crystal protein or peptide; and

(d) collecting said expressed crystal protein or peptide.

- 5 26. The method of claim 25, wherein said recombinant vector is pEG1068, pEG1077,
pEG1091, pEG1092, pEG1093, pEG365 or pEG378.
- 10 27. A peptide composition, comprising a *B. thuringiensis* crystal protein having the
amino acid sequence of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14,
SEQ ID NO:26, SEQ ID NO:28, or SEQ ID NO:30.
- 15 28. The peptide composition of claim 27, comprising a *B. thuringiensis* crystal protein
having the amino acid sequence of SEQ ID NO:10 or SEQ ID NO:12.
- 20 29. The peptide composition of claim 27, comprising a *B. thuringiensis* crystal protein
having the amino acid sequence of SEQ ID NO:14 or SEQ ID NO:26.
- 25 30. The peptide composition of claim 27, comprising a *B. thuringiensis* crystal protein
having the amino acid sequence of SEQ ID NO:28 or SEQ ID NO:30.
31. The peptide composition of claim 27, comprising a *B. thuringiensis* crystal protein
encoded by the nucleic acid sequence of SEQ ID NO:9, SEQ ID NO:11,
SEQ ID NO:13, SEQ ID NO:25, SEQ ID NO:27, or SEQ ID NO:29.
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32. The peptide composition of claim 31, comprising a *B. thuringiensis* crystal protein encoded by the nucleic acid sequence of SEQ ID NO:9 or SEQ ID NO:11.
- 5 33. The peptide composition of claim 31, comprising a *B. thuringiensis* crystal protein encoded by the nucleic acid sequence of SEQ ID NO:13 or SEQ ID NO:25.
- 10 34. The peptide composition of claim 31, comprising a *B. thuringiensis* crystal protein encoded by the nucleic acid sequence of SEQ ID NO:27 or SEQ ID NO:29.
- 15 35. A purified antibody that binds to a *B. thuringiensis* crystal protein having the amino acid sequence of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:26, SEQ ID NO:28, or SEQ ID NO:30.
- 20 36. A method for detecting a *B. thuringiensis* crystal protein or peptide in a biological sample, comprising the steps of:
- (a) obtaining a biological sample suspected of containing a *B. thuringiensis* crystal protein or peptide;
- 25 (b) contacting said sample with the antibody according to claim 35, under conditions effective to allow the formation of complexes; and
- (c) detecting the complexes so formed.

37. An immunodetection kit comprising, in suitable container means, the antibody according to claim 35, and an immunodetection reagent.
- 5 38. A transgenic plant having incorporated into its genome a transgene that encodes a *B. thuringiensis* crystal protein having the amino sequence of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:26, SEQ ID NO:28, or SEQ ID NO:30.
- 10 39. The transgenic plant of claim 38, wherein said transgene comprises the nucleic acid sequence of SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:25, SEQ ID NO:27, or SEQ ID NO:29.
- 15 40. The transgenic plant of claim 38, wherein said transgene encodes a *B. thuringiensis* crystal protein having the amino sequence of SEQ ID NO:10 or SEQ ID NO:12.
- 20 41. The transgenic plant of claim 38, wherein said transgene encodes a *B. thuringiensis* crystal protein having the amino sequence of SEQ ID NO:14 or SEQ ID NO:26.
- 25 42. The transgenic plant of claim 38, wherein said transgene encodes a *B. thuringiensis* crystal protein having the amino sequence of SEQ ID NO:28 or SEQ ID NO:30.
43. The transgenic plant of claim 39, wherein said transgene comprises the nucleic acid sequence of SEQ ID NO:9.

44. The transgenic plant of claim 39, wherein said transgene comprises the nucleic acid sequence of SEQ ID NO:11.
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45. The transgenic plant of claim 39, wherein said transgene comprises the nucleic acid sequence of SEQ ID NO:13.
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46. The transgenic plant of claim 39, wherein said transgene comprises the nucleic acid sequence of SEQ ID NO:25.
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47. The transgenic plant of claim 39, wherein said transgene comprises the nucleic acid sequence of SEQ ID NO:27.
48. The transgenic plant of claim 39, wherein said transgene comprises the nucleic acid sequence of SEQ ID NO:29.
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49. Progeny of the plant of claim 38.
50. A seed from the plant of claim 38.
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51. A seed from the progeny of claim 49.
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52. A plant from the seed of claim 51.

53. A *Bacillus thuringiensis* cell that produces a crystal protein comprising the amino acid sequence of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:26, SEQ ID NO:28, or SEQ ID NO:30.
54. The *Bacillus thuringiensis* cell of claim 53, wherein said crystal protein comprises the amino acid sequence of SEQ ID NO:10.
55. The *Bacillus thuringiensis* cell of claim 53, wherein said crystal protein comprises the amino acid sequence of SEQ ID NO:12.
56. The *Bacillus thuringiensis* cell of claim 53, wherein said crystal protein comprises the amino acid sequence of SEQ ID NO:14.
57. The *Bacillus thuringiensis* cell of claim 53, wherein said crystal protein comprises the amino acid sequence of SEQ ID NO:26.
58. The *Bacillus thuringiensis* cell of claim 53, wherein said crystal protein comprises the amino acid sequence of SEQ ID NO:28.
59. The *Bacillus thuringiensis* cell of claim 53, wherein said crystal protein comprises the amino acid sequence of SEQ ID NO:30.

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60. A *Bacillus thuringiensis* cell that produces a crystal protein encoded by the nucleic acid sequence of SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:25, SEQ ID NO:27, or SEQ ID NO:29.
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61. The *Bacillus thuringiensis* cell according to claim 60, wherein said nucleic acid sequence comprises the sequence of SEQ ID NO:9.
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62. The *Bacillus thuringiensis* cell according to claim 60, wherein said nucleic acid sequence comprises the sequence of SEQ ID NO:11.
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63. The *Bacillus thuringiensis* cell according to claim 60, wherein said nucleic acid sequence comprises the sequence of SEQ ID NO:13.
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64. The *Bacillus thuringiensis* cell according to claim 60, wherein said nucleic acid sequence comprises the sequence of SEQ ID NO:25.
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65. The *Bacillus thuringiensis* cell according to claim 60, wherein said nucleic acid sequence comprises the sequence of SEQ ID NO:27.
66. The *Bacillus thuringiensis* cell according to claim 60, wherein said nucleic acid sequence comprises the sequence of SEQ ID NO:29.

67. A *Bacillus thuringiensis* cell having the NRRL accession number B-21579.
68. A *Bacillus thuringiensis* cell having the NRRL accession number B-21580.
69. A *Bacillus thuringiensis* cell having the NRRL accession number B-21581.
70. A *Bacillus thuringiensis* cell having the NRRL accession number B-21635.
71. A *Bacillus thuringiensis* cell having the NRRL accession number B-21636.
72. A *Bacillus thuringiensis* cell having the designation EG11090.
73. A composition comprising from about 0.5% to about 99% by weight of a crystal protein having the amino acid sequence of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:26, SEQ ID NO:28, or SEQ ID NO:30.
74. A composition comprising from about 0.5% to about 99% by weight of a crystal protein encoded by the nucleic acid sequence of SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:25, SEQ ID NO:27, or SEQ ID NO:29.
75. A composition comprising a *B. thuringiensis* crystal protein prepared by a process comprising the steps of:

(a) culturing a *Bacillus thuringiensis* EG11090, NRRL B-21579, NRRL B-21580, NRRL B-21581, NRRL B-21635, or NRRL B-21636 cell under conditions effective to produce a *B. thuringiensis* crystal protein; and

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(b) obtaining said *B. thuringiensis* crystal protein from said cell.

76. The composition of claim 75, wherein said *B. thuringiensis* crystal protein is obtained in an amount of from between about 0.5% and about 99% by weight.

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77. A method of preparing a *B. thuringiensis* crystal protein comprising:

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(a) culturing a *Bacillus thuringiensis* EG11090, NRRL B-21579, NRRL B-21580, NRRL B-21581, NRRL B-21635, or NRRL B-21636 cell under conditions effective to produce a *B. thuringiensis* crystal protein; and

(b) obtaining said *B. thuringiensis* crystal protein from said cell.

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78. The composition of claim 73 or claim 74, prepared by the method of claim 77.